FEMORAL SIZING APPARATUS AND METHOD

FIELD OF THE INVENTION

[0001] The present invention relates to an apparatus and method for femoral sizing.

BACKGROUND OF THE INVENTION

[0002] Knee replacement surgery is currently performed with a view toward minimizing joint exposure by applying small incision procedures, also known as minimally invasive procedures. To obtain consistent results and aid the surgeon in such procedures, new instrumentation adapted to the smaller incision size is advantageous.

[0003] One of the important steps in knee replacement surgery is sizing correctly the femoral component and, in particular, accurately determining the anterior-posterior dimension of the resected distal femur. Several types of femoral sizers are currently available for this purpose. Nevertheless, femoral sizers that avoid soft tissue impingement and are well-suited to small-incision procedures are still desirable.

SUMMARY OF THE INVENTION

[0004] One embodiment of the invention provides a sizing apparatus for determining the anterior-posterior size of a distal end of a femur. The apparatus includes a block having a face engageable with the distal end of the

femur, and a body mounted on the block and slidable relative to the block in a medial-lateral direction. A stylus is mounted on the body.

[0005] Another embodiment provides a sizing apparatus for determining the anterior-posterior size of a distal end of a femur. The apparatus includes a block, a body, and a stylus. The block has an upper portion and a lower portion. The upper portion includes a U-shaped member with two pads engageable with the distal end of the femur, and a rod extending between the pads in the medial-lateral direction. The lower portion includes a surface engageable with the distal end of the femur, and a base. The body is slidably mounted on the rod and is slidably supported on the base of the block for movement in the medial-lateral direction. The body has a longitudinal bore and a window opening. The stylus includes a shaft slidably received in the bore for movement in an anterior-posterior direction. The shaft has an indicator viewable through the window opening.

[0006] Yet another embodiment of the invention provides a sizing apparatus for determining the anterior-posterior size of a distal end of a femur. The apparatus includes a block having a face and a base, a body mounted on the base for movement relative to the block in the medial-lateral direction, and a stylus mounted on the body. The face of the block engages the distal end of the femur.

[0007] Another embodiment of the invention provides a method for determining a size of a distal femur. The method includes providing a sizing apparatus having a block, a body slidably mounted on the block in the medial-

lateral direction and a stylus received in a bore of the block. The method includes attaching a face of the block to the distal femur and selectively sliding the body relatively to the block in a medial-lateral direction. The method further includes moving the stylus to bring a tip of the stylus in contact with an anterior surface of the distal femur, and observing an indicator on the stylus through a window opening in the body.

[0008] Further areas of applicability of the present invention will become apparent from the detailed description provided hereinafter. It should be understood that the detailed description and specific examples, while indicating the preferred embodiment of the invention, are intended for purposes of illustration only and are not intended to limit the scope of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] The present invention will become more fully understood from the detailed description and the accompanying drawings, wherein:

[0010] FIG. 1 is a front perspective view of an embodiment of a sizing apparatus according to the invention, with a body shown in a first position;

[0011] FIG. 2 is a front perspective view of the sizing apparatus of FIG. 1, with the body shown in a second position;

[0012] FIG. 3 is a side elevational view of the sizing apparatus of FIG. 1; and

[0013] FIG. 4 is a rear perspective view of the sizing apparatus of FIG. 1.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0014] The following description of the embodiments is merely exemplary in nature and is in no way intended to limit the invention, its application, or uses. Although embodiments of the invention are described below in the context of a resected distal femur, such description is merely illustrative, and the invention is not so limited. It will be appreciated that the invention can be equally practiced in connection with the distal end of any bone.

[0015] An embodiment of a femoral sizing apparatus 100 according to the invention is illustrated in FIGS. 1-4. The sizing apparatus 100 includes a block 110, a body 120 and a stylus 130. The block 110 has an upper portion 112 and a lower portion 116. The upper portion 112 includes a U-shaped member 114 having two pads 142. A rod 118 extends between the pads 142, providing a clearance 145 between the rod 118 and a surface 144 of the upper portion 112. The rod 118 may be modularly connected to the pads 142 such that the rod 118 can be detached and re-attached to the block 110 by methods known in the art, such as removable fasteners, press-fitting, taper connections, etc. As best seen in FIG. 3, the pads 142 and lower portion 116 define an engagement surface 150 that is operable to contact and engage the resected surface 94 of the distal end 92 of a femur 90 for anterior-posterior sizing of the femur 90. The anterior-posterior direction is indicated by an axis "B". The lower portion 116 of the block 110 includes a web 148 at a right angle with a base 146. The base 146 is adapted to engage modularly with a support 160 that includes feet 162. In one embodiment, the base 146 defines an opening 170 that receives an extension

164 of the support 160. Alternatively, the support 160 may be integral with the base 146. The support 160 may be stationary relative to the base 146, or may be pivotably connected to the base 146. The feet 162 provide a surface that is placed in contact with the posterior surface 98 of the distal end 92 of the femur 90 during the sizing procedure. The base 146 defines a U-shaped channel 166 adjacent to the web 148.

[0016] The body 120 includes first and second portions 172, 174 that can be arranged to form an L-shaped profile. The first portion 172 includes a longitudinal bore 180 and a front face 182 on which a calibrated scale 184 may be marked, or imprinted, or otherwise affixed. A longitudinal window opening 186 on the front face 182 of the first portion 172 adjacent to the markings of the scale 184 provides a view of the bore 180. The first portion 172 includes a projection 190 that is received in the channel 166 for slidable contact thereon. The second portion 174 includes a through-hole 192 receiving the rod 118.

[0017] The first portion 172 of the body 120, the bore 180 and the window opening 186 extend along the anterior-posterior direction when the sizing apparatus 100 is attached to the distal end 92 of the femur 90, such that the feet 162 are in contact with the posterior surface 98. The rod 118 extends in the medial-lateral direction indicated by an axis "A". When the sizing apparatus 100 is so positioned, the body 120 can slide along the rod 118 along the track defined by the channel 166.

[0018] The stylus 130 includes a shaft 132 and an arm 133 terminating in a stylus tip 134. The shaft 132 is slidably received in the longitudinal bore 180

of the first portion 172 of the body 120 and is movable along the bore 180. The arm 133 can rotate about the bore 180 with the shaft 132 or relatively to the shaft 132, such that the stylus tip 134 can be brought in contact with any point on the anterior surface 96 for determining the size of the distal end 92 of the femur 90. The shaft 132 may include on its surface an indicator 194, which is visible through the window opening 186 and provides a size reading on the scale 184 when the stylus tip 134 contacts the anterior surface 96 of the femur 90. The stylus 130 can slide axially with the body 120 in the medial-lateral direction along the rod 118 to prevent soft tissue impingement during sizing, especially in the anterior lateral corner, and to provide working space and clearance especially during small incision knee procedures. FIGS. 1 and 2 illustrate the body 120 in to different positions relatively to the block 110 along the medial-lateral direction. For left knee surgery, for example, the body 120 is displaced to the medial position illustrated in FIG. 1. For right knee surgery, the body 120 is displaced to the medial position shown in FIG. 2.

[0019] Each pad 142 may include pre-drilled holes 196 for preparing fixation holes in the distal end 92 of the femur 90. Other pre-drilled holes 198 may be used for pinning the sizing apparatus 100 to the distal end 92. The body 120 may be displaced in the medial-lateral direction to provide clearance while preparing the fixation holes on the femur 90 or while affixing the sizing apparatus 100 to the femur 90.

[0020] In operation, after the distal end 92 is resected, the sizing apparatus 100 is attached to the distal end 92, such that the feet 162 are

engaged in direct contact with the posterior surface 98 and the engagement surface 150 of the block 120 is in direct contact with the resected surface 94 of the femur 90. The body 120 is slid relatively to the block 110 in the medial-lateral direction as needed or depending on whether the operation is for the right or left knee, to avoid tissue impingement during sizing. The arm 133 of the stylus 130 is rotated, such that the stylus tip 134 contacts the anterior surface 96. Several readings may be taken on the scale 184 as the stylus tip 134 moves about the anterior surface 96 by observing the position of the indicator 194 relative to the scale 184. The size of the femur 90 is determined by the highest reading on the scale 184. During the movement of the stylus 130, the body 120 may be moved medially or laterally to accommodate the movement of the stylus 130 without causing tissue impingement.

[0021] The description of the invention is merely exemplary in nature and, thus, variations that do not depart from the gist of the invention are intended to be within the scope of the invention. Such variations are not to be regarded as a departure from the spirit and scope of the invention.